REMARKS/ARGUMENTS

Claims 1-28 are pending.

Claims 1, 4, 14, and 17 have been amended. Claims 4 and 17 comprise the limitations of claims 1 and 4, and 14 and 17, respectively.

Support for the amendments is found in the claims and specification, as originally filed. No new matter is believed to have been added.

Applicants wish to thank the Examiner for the discussion conducted on February 13, 2009. The rejections over the patent '569 and the Declaration submitted on November 17, 2008 were discussed. The undersigned representative also explained that the '569 patent does not describe the limitations of the dependent claims, e.g., claims 2-8, 12-13, 15-21, and 24-28. The Examiner indicated that he needed more time to evaluate the limitations of every dependent claim. The Examiner pointed out that claim 4 would be likely allowable.

The rejection of claims 1-3 under 35 U.S.C. 103(a) over Moczygemba, US 5,705,569 (Moczygemba I) is traversed because Moczygemba I does not describe of suggest:

(1) selecting a block copolymer mixture comprising block copolymers comprising 65 to 75 mass% of a vinyl aromatic hydrocarbon and from 25 to 35 mass% of a conjugated diene as monomer units and satisfying the claimed molecular weight distribution (Mw/Mn), M1/M3 and M2/M3 ratios, and the claimed peak top molecular weight, wherein all monomer units are charged as pure monomers and each charge is completely polymerized before the addition of the subsequent charge (as in claims 1, 4, 14, and 17),

(2) the branched block copolymer in an amount of from 65 to 90 mass% (as in claims 2 and 15),

(3) the proportion of the number of moles of S1 to the total number of moles of S1, S2 and S3 from 2 to 30 mol% (as in claims 3 and 16),

(4) the peak top molecular weight M1 corresponding to S1 from 80,000 to 220,000,

the peak top molecular weight M2 corresponding to S2 from 14,000 to 25,000, and the peak

top molecular weight M3 corresponding to S3 from 3,000 to 12,000, in the gel permeation

chromatogram of the mixture of the polymer blocks S1, S2 and S3 (as in claims 4 and 17),

(5) in the gel permeation chromatogram of the block copolymer mixture comprising a

branched block copolymer, the molecular weight distribution (Mw/Mn) of the peak at which

the peak top molecular weight becomes minimum among peaks which satisfy the following

(a) and (b), is less than 1.03: (a) the peak top molecular weight is within a range of from

20,000 to 50,000, and (b) the proportion of the area is within a range of from 3 to 15% to the

whole peak area (as in claims 5 and 18),

(6) the proportion of the area of the peak at which the peak top molecular weight

becomes maximum among peaks at which the peak top molecular weight is from 200,000 to

380,000, is from 2 to 10% to the whole peak area, in the gel permeation chromatogram of the

block copolymer mixture containing a branched block copolymer (as in claims 6 and 19),

(7) in the gel permeation chromatogram of a mixture of copolymers S1-B, S2-B and

S3-B, M4/M6 is within a range of from 4.5 to 9, and M5/M6 is within a range of from 1.3 to

1,8, where M4, M5 and M6 are peak top molecular weights of components corresponding to

S1-B, S2-B and S3-B, respectively (as in claims 7 and 20),

(8) a component providing the maximum peak area in the gel permeation

chromatogram of the block copolymer mixture has a peak top molecular weight of from

170,000 to 300,000 (as in claims 8 and 21), and

(9) a thermoplastic resin composition comprising the claimed block copolymer

mixture and a thermoplastic resin other than the block copolymer mixture (as in claims 9 and

22).

Also, (10) Moczygemba I teaches away from the claimed copolymers, and

(11) one would not have modified the copolymer of Moczygemba I to arrive at the

clamed block copolymer mixture because a goal of Moczygemba I is to balance impact

strength and ductility of an article prepared from the described block polymers, while the

claimed copolymer provides an excellent balance of transparency and impact resistance even

in an injection molded product.

Moczygemba I discloses a general process for obtaining a large number of block

copolymers (col. 2, lines 8-27; and col. 8, lines 9-29). The block copolymers of specific

embodiment 3 (the only embodiment wherein the conjugated diene polymer block B is

charged as a pure monomer) in Moczygemba I have a different structure and, therefore,

different properties from that claimed polymer because the Moczygemba I copolymers are

prepared by a different method (see Tables 3 and 19). In embodiment 3, styrene is charged

four times followed by charging butadiene, while in the claimed block copolymers obtained

by charging styrene three times.

In the polymerization method disclosed as the third embodiment in Table 19 of

Moczygemba I, the proportion of a conjugated diene contained in the copolymer is 15

mass%, while in the polymerization method disclosed in Examples 1 to 7 of the present

application, such a proportion is from 25.3 to 31.2 mass%, and, therefore, there is a great

difference between the copolymer of Moczygemba I and that claimed.

As known in the art, morphology and/or physical properties of block polymers are

different depending upon, e.g., molecular weight of a hard segment/soft segment,

composition ratio and/or compatibility.

Moczygemba I does not describe or suggest that the block polymers mixture

comprises 65-90% of the branched block polymers (as in claims 2 and 15) and the proportion

of S1 to the total number of S1, S2, and S3 is from 2 to 30% (as in claims 3 and 16).

Further, Moczygemba I does not describe or suggest:

- the peak top molecular weight M1 corresponding to S1 from 80,000 to 220,000, the peak top molecular weight M2 corresponding to S2 from 14,000 to 25,000, and the peak top molecular weight M3 corresponding to S3 from 3,000 to 12,000, in the gel permeation chromatogram of the mixture of the polymer blocks S1, S2 and S3 (as in claims 4 and 17),

- in the gel permeation chromatogram of the block copolymer mixture comprising a branched block copolymer, the molecular weight distribution (Mw/Mn) of the peak at which the peak top molecular weight becomes minimum among peaks which satisfy the following (a) and (b), is less than 1.03: (a) the peak top molecular weight is within a range of from 20,000 to 50,000, and (b) the proportion of the area is within a range of from 3 to 15% to the whole peak area (as in claims 5 and 18),

- the proportion of the area of the peak at which the peak top molecular weight becomes maximum among peaks at which the peak top molecular weight is from 200,000 to 380,000, is from 2 to 10% to the whole peak area, in the gel permeation chromatogram of the block copolymer mixture containing a branched block copolymer (as in claims 6 and 19),

- in the gel permeation chromatogram of a mixture of copolymers S1-B, S2-B and S3-B, M4/M6 is within a range of from 4.5 to 9, and M5/M6 is within a range of from 1.3 to 1,8, where M4, M5 and M6 are peak top molecular weights of components corresponding to S1-B, S2-B and S3-B, respectively (as in claims 7 and 20),

- a component providing the maximum peak area in the gel permeation chromatogram of the block copolymer mixture has a peak top molecular weight of from 170,000 to 300,000 (as in claims 8 and 21), and

- a thermoplastic resin composition comprising the claimed block copolymer mixture and a thermoplastic resin other than the block copolymer mixture (as in claims 9 and 22).

It is impossible to easily obtain the claimed block polymers from the disclosure of Moczygemba I. In the present application, the molecular weight distribution/ratios of a vinyl

aromatic hydrocarbon block such as styrene within the claimed range provides excellent transparency, impact resistance and mixing properties with another thermoplastic resin (pages 1-3 of the present specification). Particularly, in the form of an injection molding, it is possible to extremely improve the impact resistance without deteriorating transparency (pages 3 and 5; the Examples).

One would not have modified the copolymer of Moczygemba I to arrive at the clamed block copolymer mixture because a goal of Moczygemba I is to balance impact strength and ductility of an article prepared from the described block polymers (col. 1, lines 19-50), while the claimed copolymer provides an excellent balance of transparency and impact resistance even in an injection molded product (see page 1 of the present specification).

In addition, Moczygemba I generally describes that the butadiene content is 5-45 mass %, but specifically describes co-polymers having a different content of butadiene, i.e., 5-25 mass % with the preferred range of 10-20 mass % and 13-17 mass %, 15 mass %, and 7 mass % (see Table 7 and Tables 14-17 and 21). Moczygemba I does not describe or suggest selecting 25-35 mass % of butadiene in the copolymers. Comparative Examples of Table 23 comprise 25 mass % of butadiene which does not provide a copolymer with the satisfactory properties, i.e., haze, impact strengths (see col. 27, line 59 to col. 28, line 30 and Table 24). Thus, Moczygemba I *teaches away* from the claimed copolymers.

Thus, Moczygemba I does not make the claimed block polymer obvious. Applicants request that the rejection be withdrawn.

Claims 1-28 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting over claims 1-10 of co-pending application 10/549,574. Applicants respectfully traverse.

Claim 1 of the present application is directed to a block copolymer mixture comprising a <u>branched block copolymer</u>, the block copolymer mixture comprises from 65 to 75 mass% of a vinyl aromatic hydrocarbon and from 25 to 35 mass% of a conjugated diene as monomer units, a linear block copolymer prior to coupling is formed by coupling living active site represented by the following formulae:

S1-B-Li

S2-B-Li

S3-B-Li,

wherein each of S1, S2 and S3 is a polymer block consisting of a vinyl aromatic hydrocarbon as monomer units, B is a polymer block consisting of a conjugated diene as monomer units, and Li is a living active site comprising lithium, and the number average molecular weights are S1>S2>S3, and further, (1) molecular weight distribution (Mw/Mn) of a mixture of the polymer blocks S1, S2 and S3 each comprising a vinyl aromatic hydrocarbon as monomer units is within a range of from 3.25 to 6, and (2) in a gel permeation chromatogram of the mixture of the polymer blocks S1, S2 and S3, M1/M3 is within a range of from 13 to 25, and M2/M3 is within a range of from 2 to 4, where M1, M2 and M3 are peak top molecular weights of components corresponding to S1, S2 and S3, respectively, and wherein all monomer units are charged as pure monomers and each charge is completely polymerized before the addition of the subsequent charge.

Claim 1 of Appl. '574 is directed to a linear block copolymer composition, comprising from 55 to 95 mass% of a vinyl aromatic hydrocarbon and from 5 to 45 mass% of a conjugated diene as monomer units. The linear block copolymer composition is a mixture of a <u>linear block copolymer</u> having at least three types of polymer blocks with different molecular weights, each comprising a vinyl aromatic hydrocarbon as monomer units and represented by the following formula:

S-B-S,

where S is a polymer block comprising a vinyl aromatic hydrocarbon as monomer units, and

B is a polymer block consisting of conjugated diene monomer units; and further,

(1) the molecular weight distribution (Mw/Mn) of a mixture of the polymer blocks

each comprising a vinyl aromatic hydrocarbon as monomer units, is within a range of from

3.35 to 6, and

(2) in a gel permeation chromatogram of a mixture of the polymer blocks each

comprising a vinyl aromatic hydrocarbon as monomer units, M1/M2 is within a range of

from 12.5 to 25, where M1 is the peak top molecular weight corresponding to a peak at which

the peak top molecular weight becomes maximum among peaks forming a proportion of the

area of at least 30% to the whole peak area, and M2 is the peak top molecular weight

corresponding to a peak at which the peak top molecular weight becomes minimum among

peaks at which the peak top molecular weight is at most 50,000 and which form a proportion

of the area of at least 20% to the whole peak area.

As known in the art, morphology and/or physical properties of block polymers are

different depending upon, e.g., molecular weight of a hard segment/soft segment,

composition ratio and/or compatibility.

The claimed branched block copolymers (see for illustration page 38 of the present

specification) are different from linear copolymers of Appl. '574. The properties of a block

copolymer composition, such as dynamic properties, impact strength, transparency,

compatibility, and a balance of transparency and impact resistance in an injection molded

product are determined by characteristics such as molecular weight, molecular weight

distribution, morphology, structure, top peak molecular weight, ratios of molecular weights,

etc.

It is impossible to easily obtain the claimed block polymers based on the linear block copolymers of Appl. '574. In the present application, the molecular weight distribution/ratios of a vinyl aromatic hydrocarbon block such as styrene within the claimed range provides excellent transparency, impact resistance and mixing properties with another thermoplastic resin (pages 1-3 of the present specification). Particularly, in the form of an injection molding, it is possible to extremely improve the impact resistance without deteriorating transparency (pages 3 and 5; the Examples).

One would not have reasonably expected that the linear copolymer of Appl. '574 can provide the same properties as the claimed block copolymers (e.g., an excellent balance of transparency and impact resistance even in an injection molded product) because the properties of a block copolymer composition are defined by the physical properties (structure, morphology, molecular weight distribution, etc.).

Thus, claims 1-28 are not obvious over claims 1-10 of Appl. '574.

Applicants request that the rejection be withdrawn.

A Notice of Allowance for all pending claims is requested.

Respectfully submitted,

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